CLAIMS:

1. A process for electrochemically reducing a metal oxide feed material in a solid state in an electrolytic cell of the type that includes a molten bath of electrolyte, an anode, a cathode, and a means for applying a potential across the anode and the cathode, which process includes the steps of: (a) applying a potential across the anode and the cathode that is capable of electrochemically reducing metal oxide supplied to the molten electrolyte bath, (b) continuously or semi-continuously supplying the metal oxide feed material into the bath, (c) transporting the metal oxide feed material along a path within the bath and reducing the metal oxide as the feed material moves along the path, (d) continuously or semi-continuously removing at least partially reduced material from the bath, (e) supplying an amount of electrolyte into the bath that is greater than the amount of electrolyte that is required to compensate for loss of reduced material from the bath and electrolyte removed from the bath with the reduced material, and (f) removing molten electrolyte from the bath to maintain the bath height at a required height or within a range of required heights.

2. The process defined in claim 1 wherein the electrolyte addition in step (e) is on a continuous or a periodic basis.

3. The process defined in claim 1 or claim 2 wherein the electrolyte added to the bath in step (e) is in a molten phase or a solid phase.

4. The process defined in any one of the preceding claims wherein step (e) includes feeding electrolyte in an amount that is between 70% and 100% of the amount of metal oxide feed material supplied to the bath in step (b) on a

time averaged basis.

5. The process defined in any one of the preceding claims wherein the metal oxide feed material is in the form of powders and/or pellets.

6. The process defined in any one of the preceding claims includes treating the electrolyte removed from the bath in step (f) to remove contaminants and feeding the treated electrolyte to the bath.

7. The process defined in any one of the preceding claims includes applying a cell potential above a decomposition potential of at least one constituent of the electrolyte so that there are cations of a metal other than that of the cathode metal oxide in the electrolyte.

8. The process defined in any one of the preceding claims wherein the metal oxide is titania and the electrolyte is a $CaCl_2$-based electrolyte that includes CaO as one of the constituents.

9. The process defined in claim 8 includes maintaining the cell potential above the decomposition potential for CaO.

10. An electrolytic cell for electrochemically reducing metal oxide feed material which includes (a) a bath of a molten electrolyte, (b) a cathode, (c) an anode, (d) a means for applying a potential across the anodes and the cathode, (e) a means for supplying metal oxide feed material to the electrolyte bath, (f) a means for removing at least partially electrochemically reduced metal oxides from the electrolyte bath, (g) a means for supplying an amount of electrolyte into the bath that is greater than the amount of electrolyte that is required to compensate for loss of reduced material and electrolyte retained with

reduced material removed from the bath, and (f) a means for removing molten electrolyte from the bath to maintain the bath height at a required height or within a range of required heights.

11. The cell defined in claim 10 further includes a means for treating the electrolyte removed from the bath in step (f) to remove contaminants from the electrolyte and for feeding the treated electrolyte to the bath.

12. The cell defined in claim 10 or claim 11 wherein the means for applying a potential across the anodes and the cathode includes (a) a power source and (b) an electrical circuit that electrically interconnects the power source, the anodes, and the cathode.